National Aeronautics and
Space Administration

George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama 35812

ED44

Marshall Space Flight Center Electromagnetic Test Facility (METF)

Customer Information Package

Using the MSFC EMI Test Facility (METF)

This document is intended as an introduction and guide for potential customers of the METF. It provides a detailed description of the facility and its capabilities, what information the customer must provide in order to use the facility, and what can be expected when bringing equipment into the facility for testing. A METF Customer Agreement Form (MSFC Form 4404) with instructions and a Test Readiness checklist are provided as attachments. The document is divided into three sections: "METF Description and Capabilities," "Required Customer Information," and "Using the Facility."

1. METF Description and Capabilities

The METF is located in the middle of the south side of Building 4708 in room 1191. (See Figure 1 for layout). Power is controlled and distributed within the test facility by power distribution panels and circuit breakers. Two separate, shielded, semi-anechoic enclosures supported by instrument and amplifier rooms comprise the central EMI testing areas. The enclosures are certified to attenuate power levels to -100dB to the outside. Control consoles, offices, and support equipment areas are maintained outside the shielded enclosures. Ambient background levels measured within the chamber with the Equipment Under Test (EUT) de-energized and all test equipment turned on will be at least 6 dB below allowable specified limits when the tests are performed.

The EMI Test Facility personnel are available to answer questions, provide feedback, and help with your EMI testing needs. Equipment and procedures are in place to test to the following specifications:

Specification	Test Capabilities
MSFC-SPEC-521B	CE01, CE03, TT01, RE02, RE04, CS01, CS02, CS06, RS03
SL-E-0002	CE01, CE03, TT01, RE02, RE04, CS01, CS02, CS06, RS03
SSP 30237/238	CE01, CE03, CE07, RE02, CS01, CS02, CS06, RS03
MIL-STD-461D (partial)	CE102, RE102, RS103, CS101

The METF can currently provide the following power levels:

28 V dc	50 Amps
120 V dc	50 Amps

Other power sources may be provided if arrangements are made far enough in advance.

Given the proper amount of leadtime, the special test equipment can be obtained, calibrated and ready for use when the customer arrives for testing.

Scheduling Priority

In the event of a scheduling conflict, priorities are set as follows:

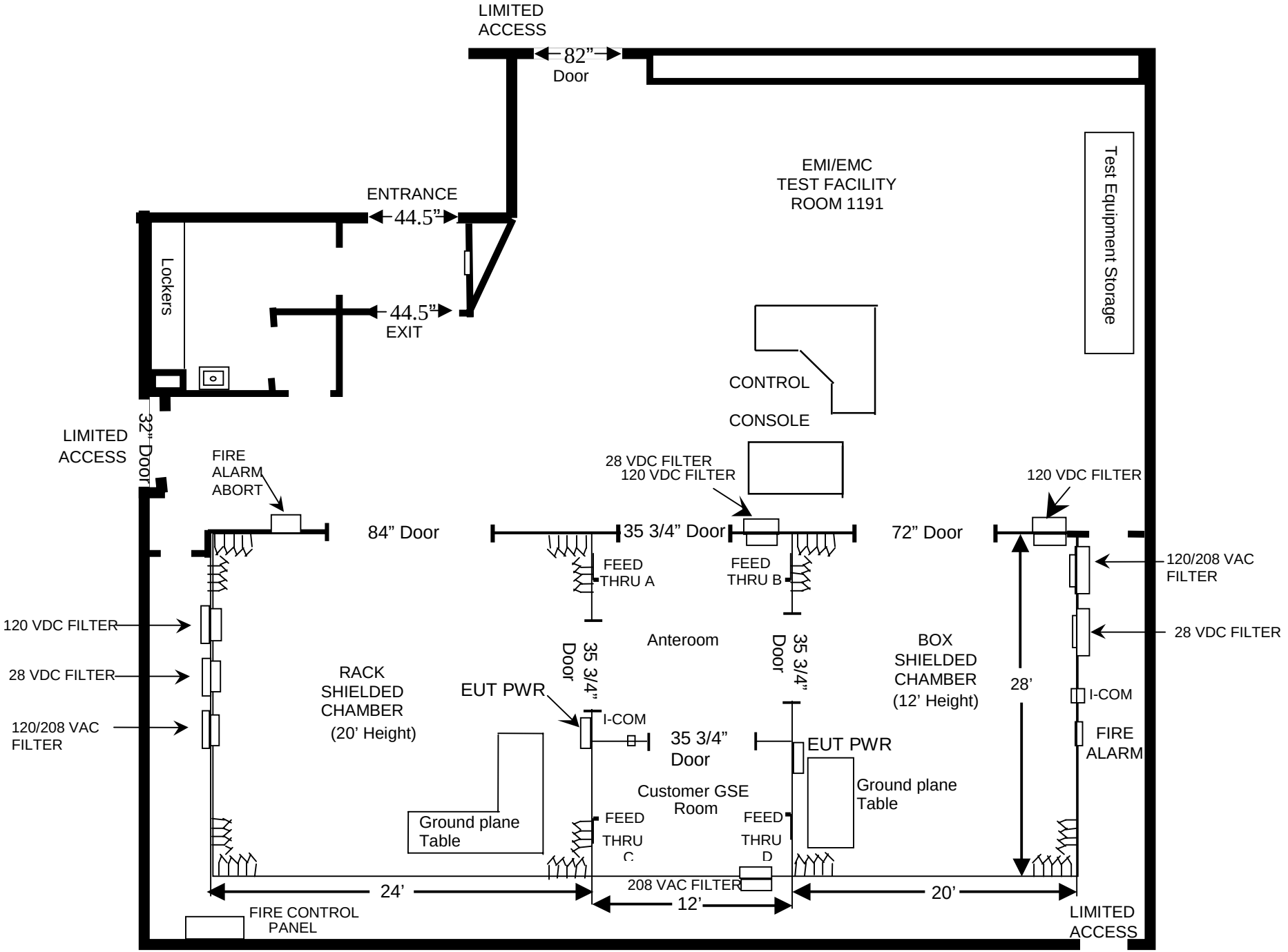
- Flight hardware qualification testing has priority over all developmental tests
- Shuttle and Space Station core equipment has priority over payloads
- Projects with earlier launch dates have priority over projects with later launch dates
- With all else being equal, the project that first submits the METF Customer Agreement Form has priority.

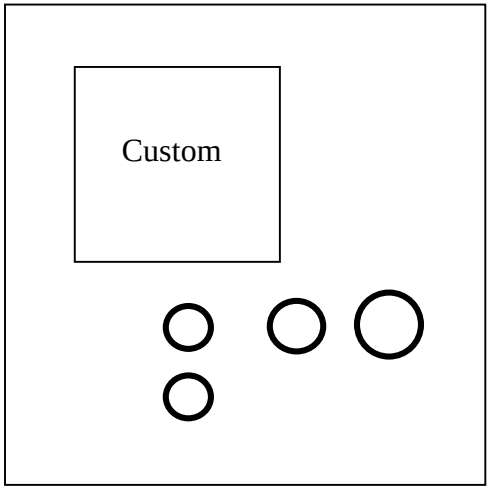
Safety

The test facility is capable of generating electromagnetic field levels of sufficient energy to be harmful to humans. The equipment under test (EUT) will be housed in a shielded enclosure designed to attenuate electric fields up to 100 decibels (dB). Precautions are taken to ensure personnel have exited the test chamber and that chamber doors are closed prior to energizing antennas.

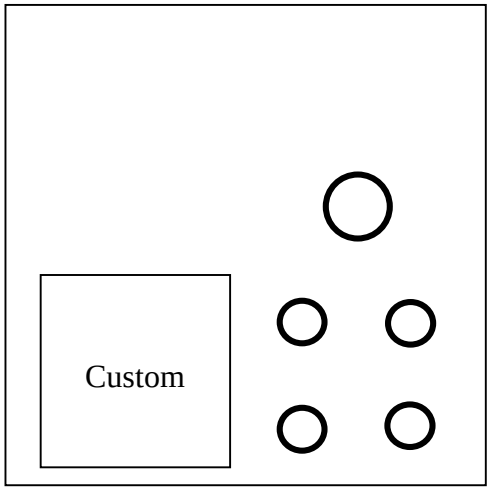
METF Layout

Figure 1, the METF layout, includes door dimensions to allow customers to determine if their equipment will pass through them into the test chambers. All doors are standard 6' 7" high, except the 84" door (12' high) to the Rack Shielded Chamber and the limited access 82" door (9' 6" high) into the METF. Special arrangements must be made with the Boeing 4708 High Bay Manager to use the 82" limited access door. The test chambers, the control console, and the customer ground support equipment (GSE) room are depicted in the layout. Test equipment/GSE, will be located in the customer GSE room. It is recommended that cables from the GSE to the EUT be at least 15' long. The carbon cones on the test chamber walls are 16" thick and some tests require at least 2 meters of cable on the ground plane table. Cables enter the test chambers via interface panels that are ¼" steel plates with stuff tubes and rectangular openings to accept custom connector panels (see figure 2). Customers may be required to provide connector panels that use non-standard feedthrough or bulkhead connectors for connecting the GSE to the EUT. The requirement for nonstandard connectors should be noted in block 17 of the Customer Agreement Form. The provider of the custom feedthrough panel can be negotiated with METF personnel. Stuff tubes are metal tubes welded to holes in the interface panels. Figure 3 shows some examples of using the stuff tubes as well as some examples of connector types.

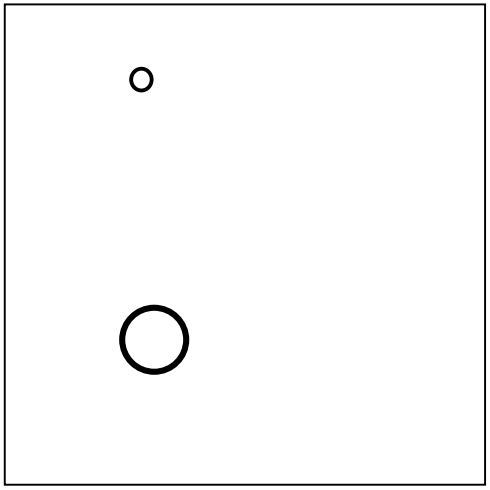

LIMITED ACCESS
82" Door
EMI/EMC TEST FACILITY ROOM 1191
Test Equipment Storage
ENTRANCE
44.5"
Lockers
44.5"
EXIT
CONTROL CONSOLE
LIMITED ACCESS
32" Door
FIRE ALARM ABORT
28 VDC FILTER
120 VDC FILTER
120 VDC FILTER
84" Door
35 3/4" Door
72" Door
FEED THRU A
FEED THRU B
120/208 VAC FILTER
120 VDC FILTER
28 VDC FILTER
120/208 VAC FILTER
Anteroom
35 3/4" Door
35 3/4" Door
BOX SHIELDED CHAMBER (12' Height)
28'
RACK SHIELDED CHAMBER (20' Height)
EUT PWR
I-COM
35 3/4" Door
EUT PWR
I-COM
FIRE ALARM
Customer GSE Room
Ground plane Table
Ground plane Table
FEED THRU C
FEED THRU D
208 VAC FILTER
24'
12'
20'
FIRE CONTROL PANEL
LIMITED ACCESS



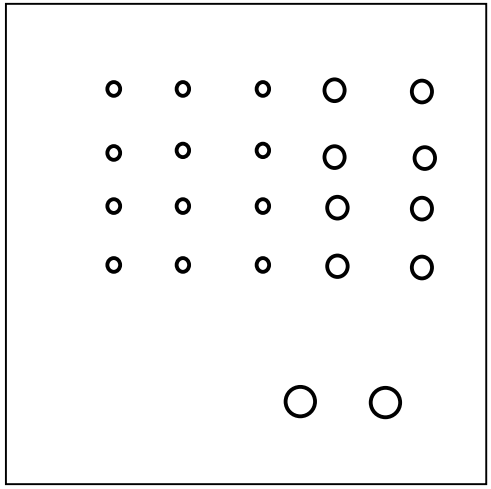
Feed Thru
Plate D
1 - 4” Stuff Tube
1 – 3” Stuff Tube
2 – 2” stuff Tubes
1 – 13” x 13” Custom panel



Feed Thru
Plate C
1 - 4” Stuff Tube
4 – 2” stuff Tubes
1 – 12” x 12” Custom panel



Feed Thru
Plate A
1 - 4” Stuff Tube
1 – Optical connector (not for customer use)



Feed Thru
Plate B

Not for customer use

Note: METF to specify: dimensions, material, and mounting holes for customer provided feedthrough panels

Figure 2. Test Chamber Feedthrough Panels

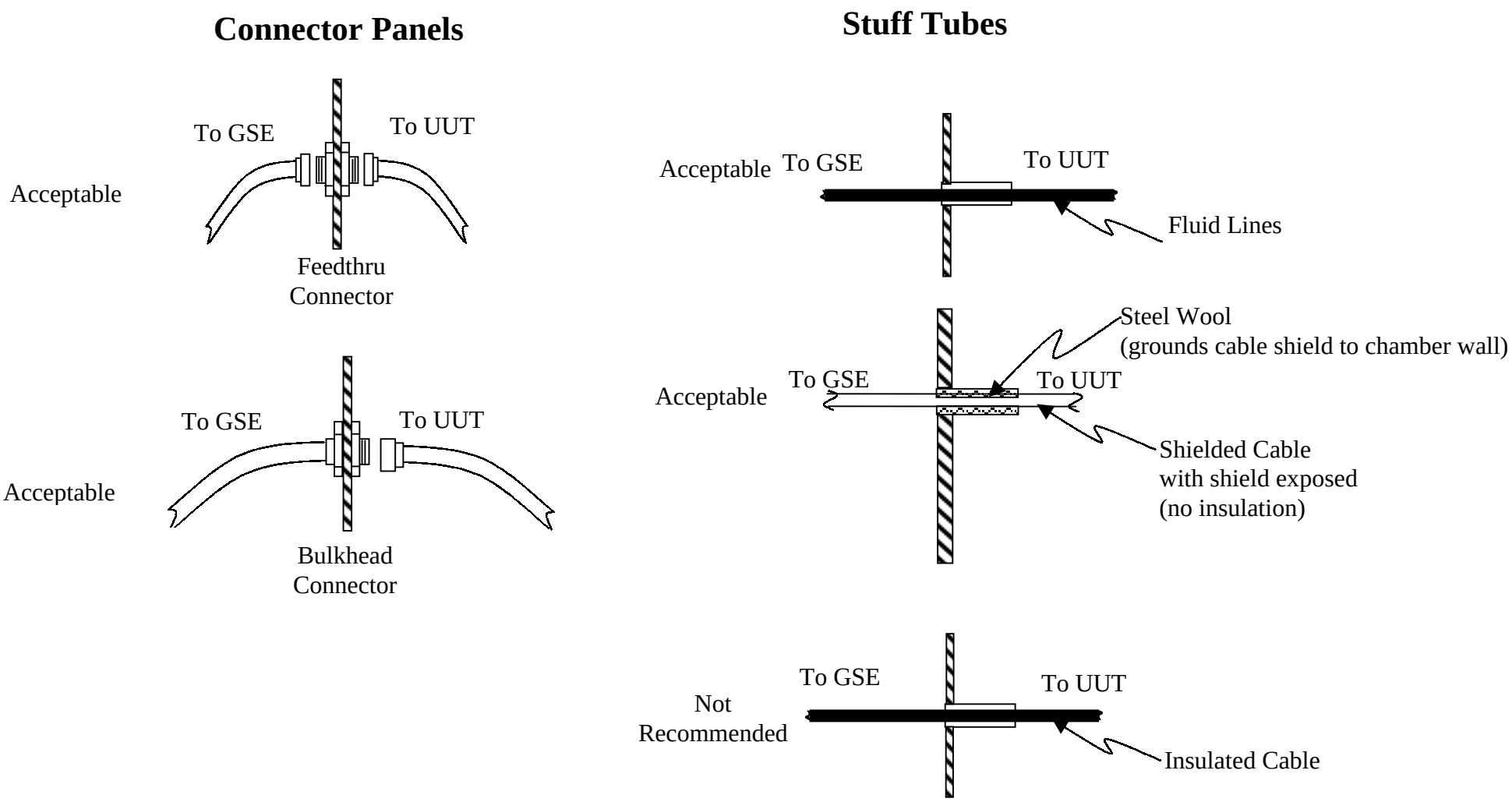


Figure 3. Examples of utilization of stuff tubes and connectors

2. Required Customer Information

The Customer Agreement Form (MSFC Form 4404) is to be completed and returned well in advance of the projected test date. This will allow time to review the information and schedule the test and equipment appropriately. Examples of information that should be specified in the "special remarks" section of the form are: Required voltages and currents, special test equipment, special handling equipment, and if the EUT is to fly on multiple carriers.

A copy of the EMI test procedure should be submitted at least 30 days prior to the scheduled test date. EMI test personnel will review the test procedure to ensure that the facility can perform the designated tests. If any findings are discovered in the review, there will be sufficient time to resolve these issues prior to the scheduled test.

The METF should be apprised of any changes that could affect the scheduled test date. Sometimes tests are scheduled on an "as available" basis. Notification far enough in advance could allow schedules to be adjusted to accommodate you at another time.

A Customer Supplied Product (CSP) tag (MSFC tag 14) per MSFC MPG 4000.1 must accompany all non-MSFC equipment brought on-site for testing. Products purchased by MSFC are not considered CSPs. The Marshall Lead Representative is responsible for negotiating the Customer Supplied Product Arrangement (CSPA) and performing all actions necessary to obtain the CSP tag.

3. Using the Facility

Configuring the EUT for testing is a joint effort by the EMI test personnel and the customer. The customer is responsible for all special handling, setup, and movement of the EUT hardware or parts.

Upon completion of setup, EMI test personnel will take one copy of the Test Procedure and mark the cover "AS RUN RECORD" including the "RUN #". The customer is responsible for tracking their non-conformances. It is also the customer's responsibility to make an initial determination of the effect of an anomaly, as to whether or not corrections are necessary, and, if necessary, to obtain approval for re-testing. Test discrepancies for Customer Supplied Products (CSPs) will be controlled and documented in accordance with the appropriate Customer Supplied Product Agreement (CSPA).

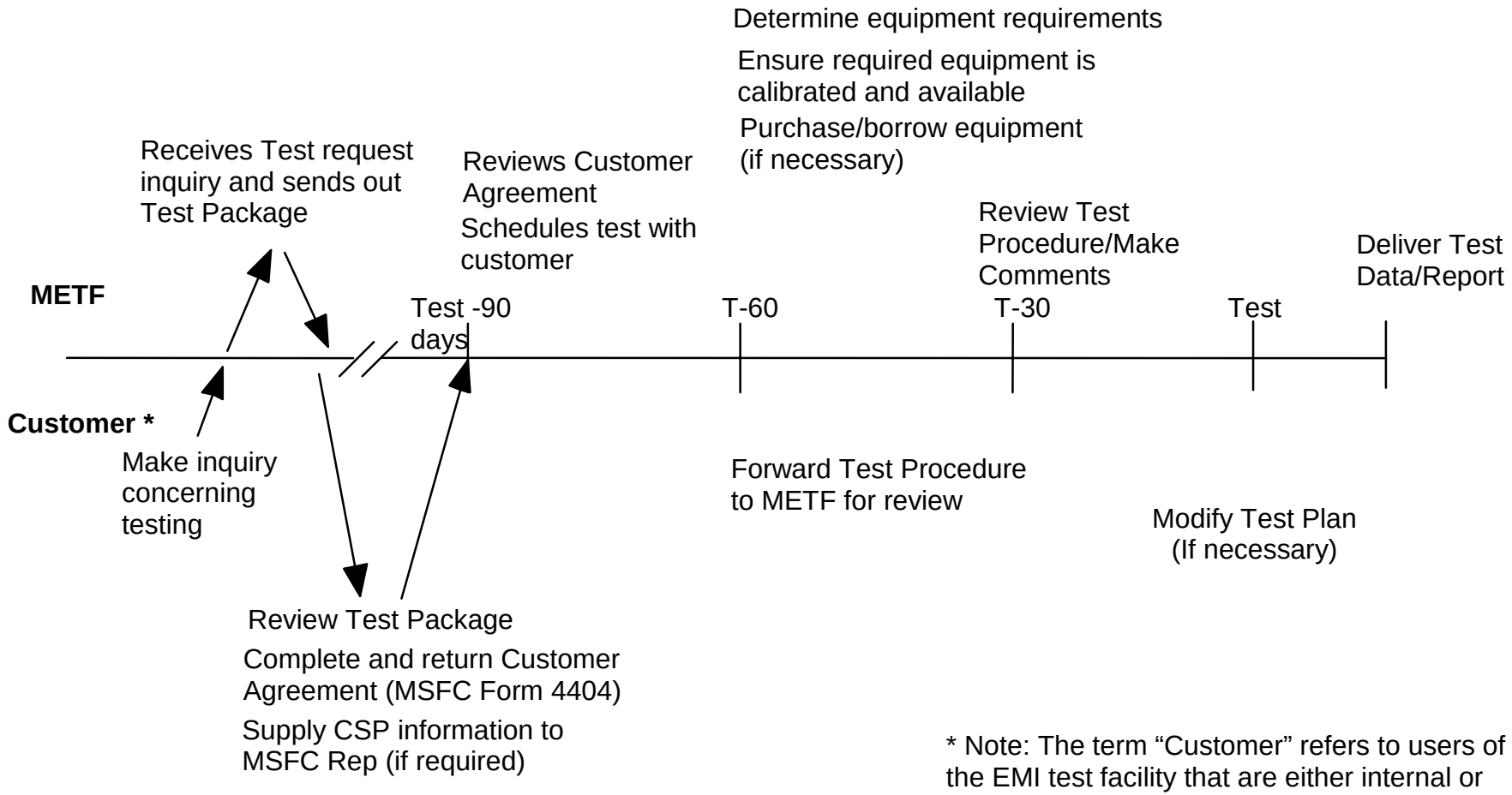
Should a facility problem arise during testing, a Test Discrepancy Report (TDR) will be written and documented on the "AS RUN RECORD". The customer will evaluate the discrepancy to determine whether or not it is a constraint to further testing.

A test report will be delivered to the customer upon completion of testing. Customers will be provided a customer comment form, MSFC Form 4306, to be filled out and returned to ED44.

The EMI Test Facility can be operated as a class 300K clean room, depending on the type of equipment being tested. When operating as a clean room, the following rules must be observed.

- Personnel will ensure that, prior to entering clean room, the full sole of both shoes comes in contact with entry tacky mats.
- Personnel entering will remove, replace, clean, or cover any article of clothing not visibly clean of dirt or contaminants.
- Personnel entering with shoes not visibly clean will use a shoe cleaner for at least five (5) seconds on each shoe, perform a visible check, and re-use as necessary.
- Personnel will make every effort to enter the clean room only when the door to the next level of containment is closed.
- Clean room garments will be donned outside controlled areas from the head down with care taken not to contact the floor.
- Clean room garments will be temporarily stored in prep room lockers when not in use.
- Personnel will verify that clean room garments are properly fastened, zippered, etc., and that caps and hoods cover all the hair possible, particularly above the forehead prior to entering.
- Smoking (or use of smokeless tobacco products), eating, or drinking is prohibited.
- Personal grooming will not be conducted in the clean room.
- Sawing, filing, cutting, drilling, soldering, or other particulate producing activities will be performed only with suitable exhaust venting as determined by the E3 Test Director to maintain room integrity.

Generic METF EMI Test Schedule



* Note: The term “Customer” refers to users of the EMI test facility that are either internal or external to MSFC. It may also refer to a Project Office acting as a representative for an off-site user of the facility.